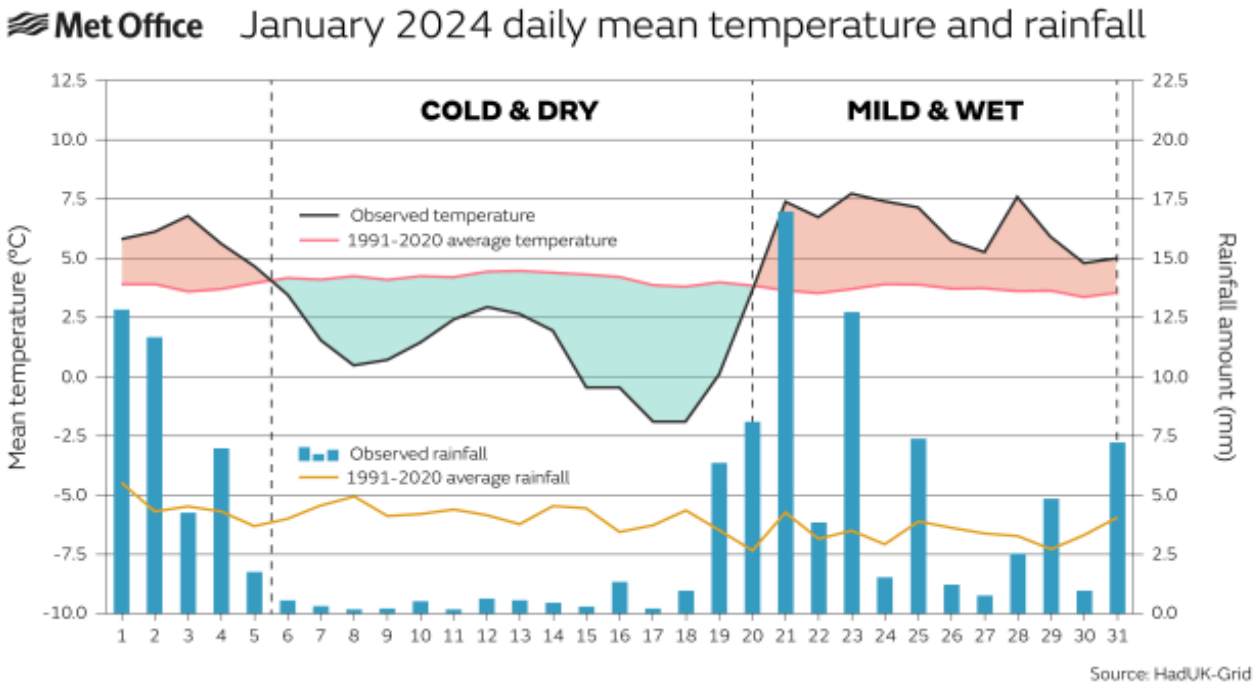
A month of contrasts for January’s weather

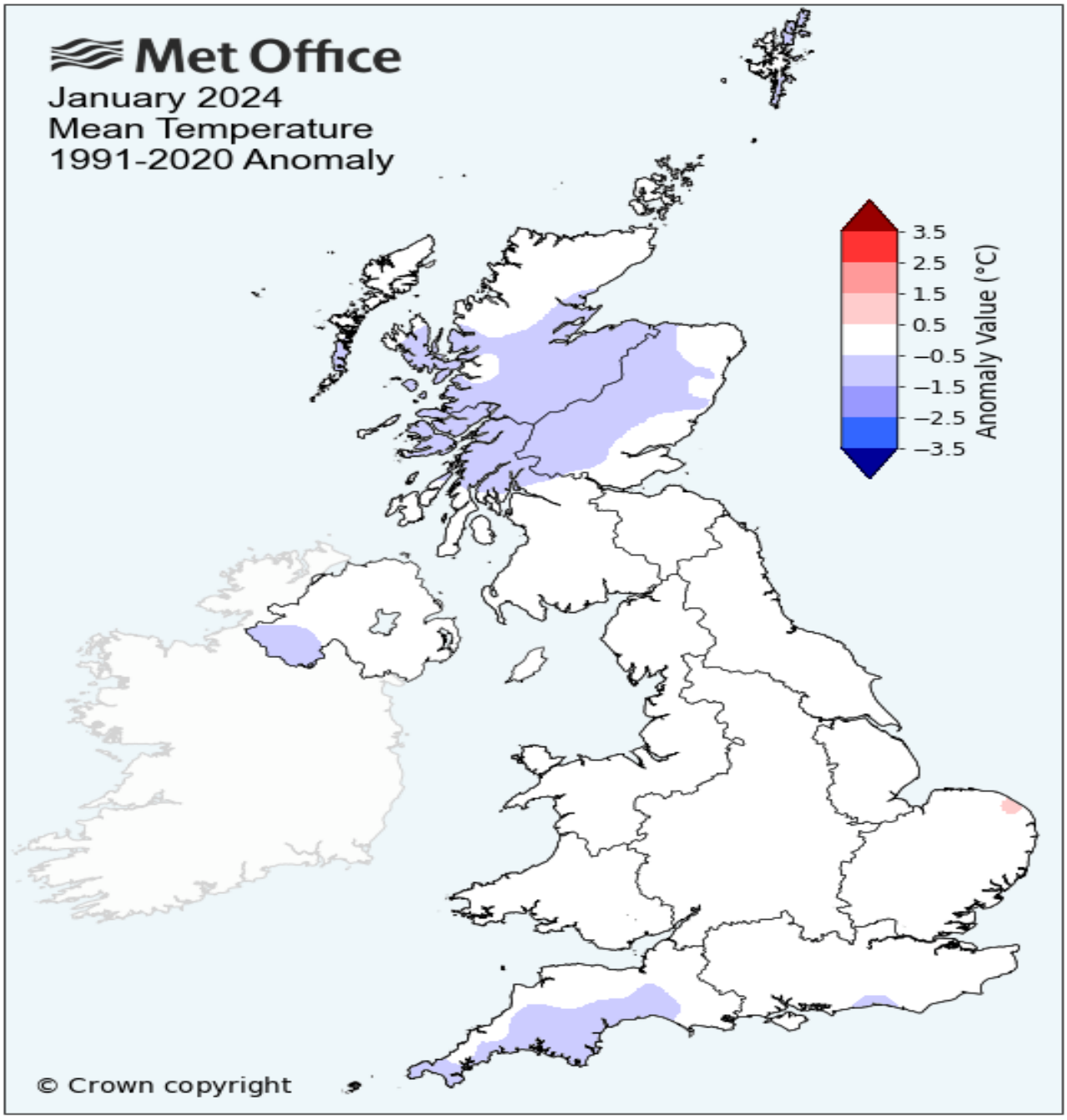
Description

January 2024 brought a month of contrasts to the UK weather, with three named storms, a significant spell of cold, wintry weather and finally a new UK daily maximum temperature record for January.

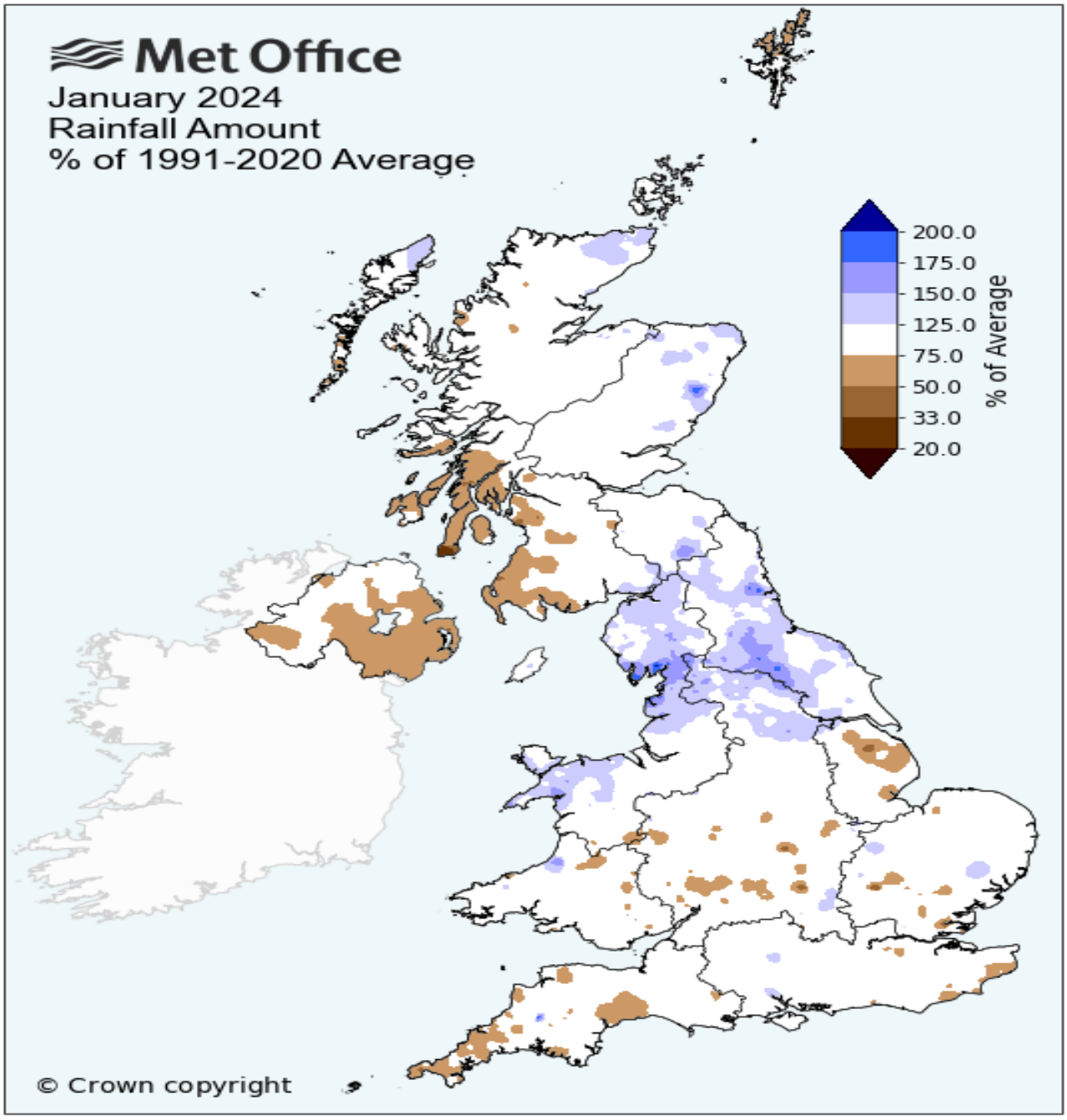
Temperatures and rainfall amounts have varied throughout the month, with mild and wet weather interrupted by a cold and dry spell from the second week of January, albeit with some significant snow for northern areas of the UK.



Overall, this means that the average mean temperature for the UK for January 2024 is near average according to provisional Met Office figures. UK mean temperatures ended the month at 3.8°C, around 0.1°C lower than the long-term average for the month.



The fluctuations in rainfall throughout the month also resulted in near-average rainfall amounts for the month, though Northern Ireland and Scotland were drier than average. UK rainfall was 3% less than average, with 117.5mm of rain. Northern England saw 22% more rain than average, with 111.9mm falling in the month.



Met Office Senior Scientist Mike Kendon said: “Overall, the UK temperature and rainfall for January were fairly near average but these belie the fact that the weather has never been too far away from the headlines. Storms Henk, Jocelyn and Isha all brought significant impacts, as did the cold and snowy conditions around the middle of the month.

“Of course, contrasting winter weather in the UK isn’t a new phenomenon, as subtle shifts in the jet stream can lead to significantly different conditions in the UK. This month we’ve seen clearly how cold northerly winds can bring winter hazards, while Atlantic westerlies can bring some impactful storms. When you add in a late-month warm spell from the south, you get a sense of the mixed conditions the country has had. What this January clearly demonstrates is just how abrupt these changes in weather type can be.”

Gardeners will be glad of more subdued rainfall figures compared to the wet conditions of December, according to Royal Horticultural Society Chief Horticulturist Guy Barter. He said: “Gardeners will have been grateful for a break in January from the rainy autumn and winter weather that has hindered getting the garden ready for spring.

“Although conditions have been pleasant, a cold, but not bitter, January is favoured by gardeners as it holds back the spring flowering of fruit trees and bushes that are vulnerable to frost damage if they flower too early. Gardeners will be hoping for a dry, chilly February.”

Contrasting temperatures

A northerly flow of air resulted in a period of significant cold weather from around the second week of January, with snow and ice hazards for many in the northern half of the UK, especially the north of Scotland. Shetland was particularly hard-hit with bitter northerly winds and temperatures struggling to rise much above freezing with deep lying snow.

On 17 January, -14°C at Dalwhinnie (Invernesshire) was the lowest temperatures dipped in the month, with a snow depth of 37cm reported at Altnaharra (Sutherland) on 18 January. Despite the UK’s warming climate, spells of wintry weather are to be expected and this was one of the more notable such spells since the exceptional December of 2010.

On the flip side, the month started mild and very wet and has concluded mild, with a new UK daily maximum temperature record for January of 19.9°C recorded at Achfary on 28 January. This is also Scotland’s highest winter temperature on record.

Mike Kendon explained some of the meteorological factors behind north-west Scotland’s unusually high temperatures near the end of the month. He said: “The Foehn effect causes a marked contrast in temperature across a mountainous area, with cooler, moister conditions on the windward side and warmer, drier conditions on the leeward side as the air dries out as it is forced up and over the higher ground.

“This effect can be responsible for some unusually high winter temperatures in both Scotland and Northern Ireland, although these tend to be highly localized. While the Foehn effect was the primary cause of this record, we must set this against a backdrop of increasing mean and maximum temperatures more generally as our climate continues to warm.”

Since 2011, the UK has recorded a new individual highest maximum daily temperature extreme for six of the 12 months of the year – January (2024), February (2019), July (2022), October (2011), November (2015) and December (2019). In contrast, none of the UK's individual lowest minimum temperature extremes in a month have occurred this century.

The below maps show contrasting temperature anomalies seen in the month, with a cold pool of air on 17 January and a warm southerly flow coupled with the Foehn effect in parts of Scotland on 28 January
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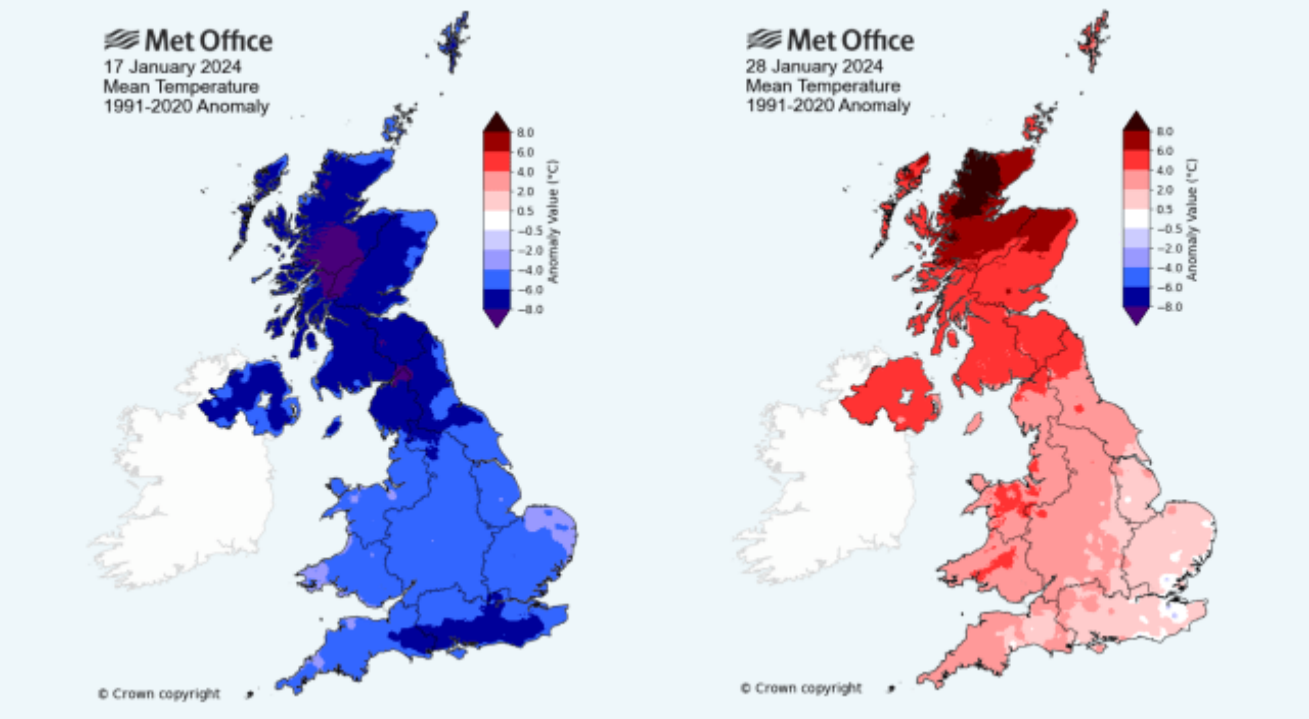
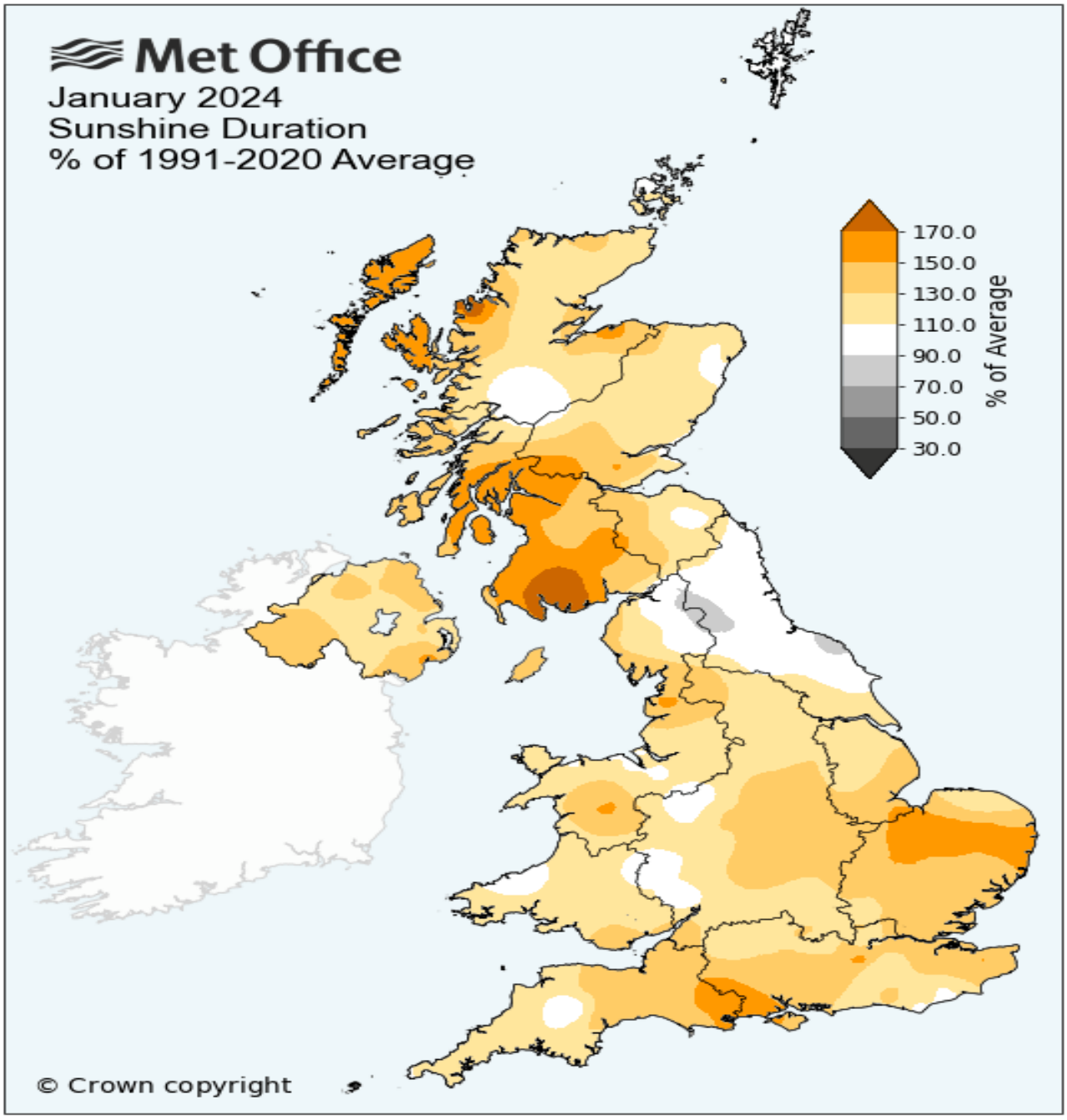


A sunny start to the year

Despite the mix in conditions, sunshine was a relatively frequent visitor in January.

The UK had its sixth sunniest January on record in a series which goes back to 1910. There were 61 hours of sunshine on average in the UK, which is 28% more than average. The relatively sunny month was a welcome contrast to December, with just 27.9 hours, around two-thirds of normal and less than an hour a day.



January's sunny theme was replicated across much of the UK, with England and Scotland recording sunshine amounts within their top ten sunniest for the month, with Wales and Northern Ireland also seeing sunshine amounts well above average.

Three storms in the month

Three named storms impacted the UK in the month as Henk, Isha and Jocelyn brought strong winds and heavy rain for some. A recent blog looks at the underlying factors behind what has been a stormy autumn and winter so far.

Henk brought significant flooding impacts as well as strong winds, while Isha was the most notable windstorm since Eunice in 2022, with extensive Amber wind warnings issued by the Met Office as well as an unusual overnight red warning for some. A gust of 99mph was recorded in Northumberland as part of Storm Isha.

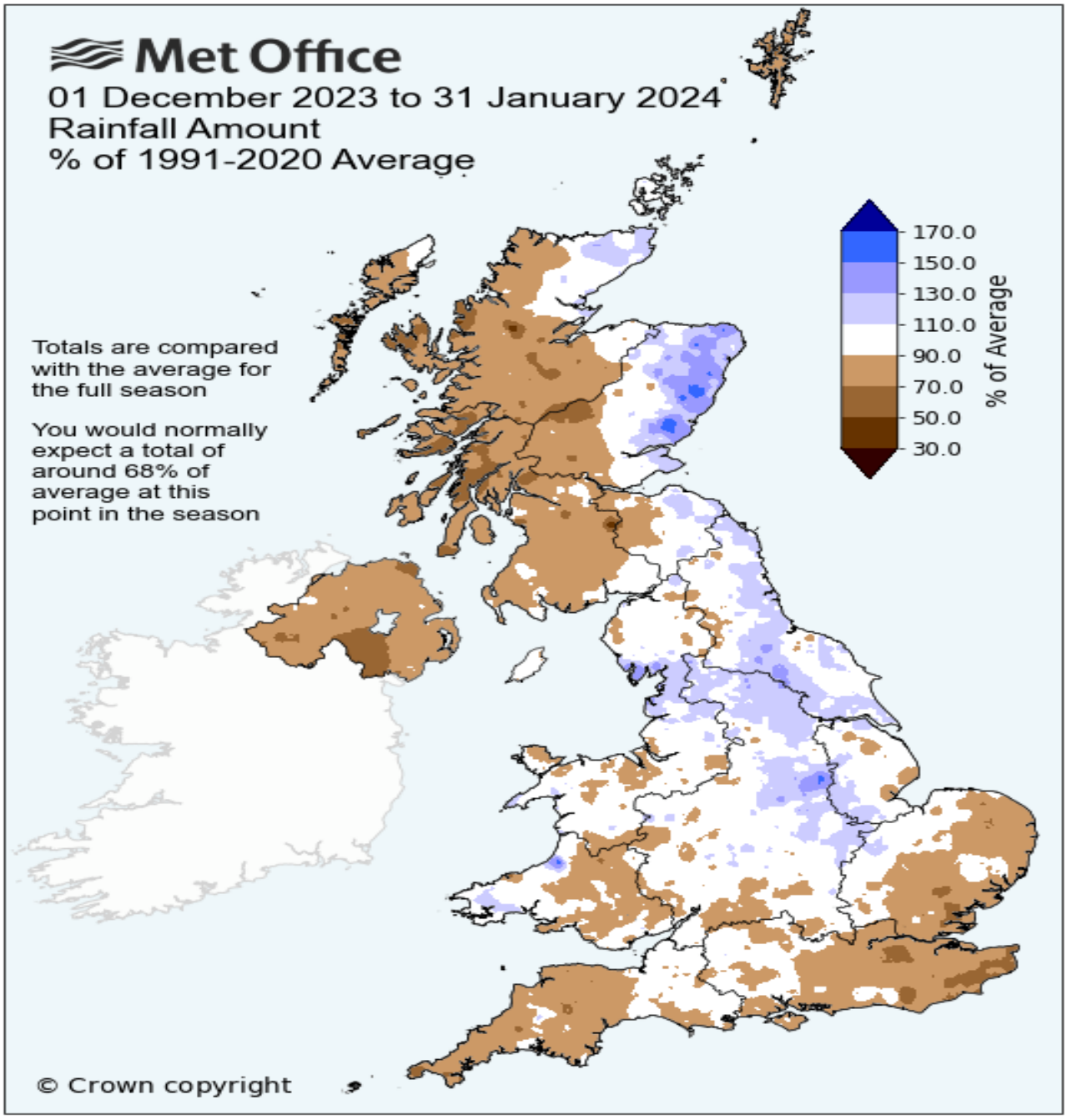
Storm Jocelyn, which was named by Met Eireann, continued to bring strong winds to much of the north of the UK.

Provisional January 2024	Mean temp (°C)		Sunshine (hours)		Rainfall (mm)	
	Actual	Diff from avg (°C)	Actual	% of avg	Actual	% of avg
UK	3.8	-0.1	61.0	128	117.5	97
England	4.4	0.0	70.6	128	85.1	102
Wales	4.4	-0.0	56.6	120	161.9	104
Scotland	2.5	-0.5	46.8	133	165.1	93
N Ireland	4.2	-0.3	55.6	130	86.0	75

Winter so far

Meteorological winter so far is tracking wetter and slightly warmer than average, though with a month still to go there is time for these figures to change significantly.

At this point in the season you'd expect to have seen 68% of the season's total seasonal average rainfall. At the conclusion of January, the UK has so far seen 89% of the average rainfall for the whole of the season, although much of north-east England and eastern Scotland have already received more than the whole-season average rainfall, with a month still to go.



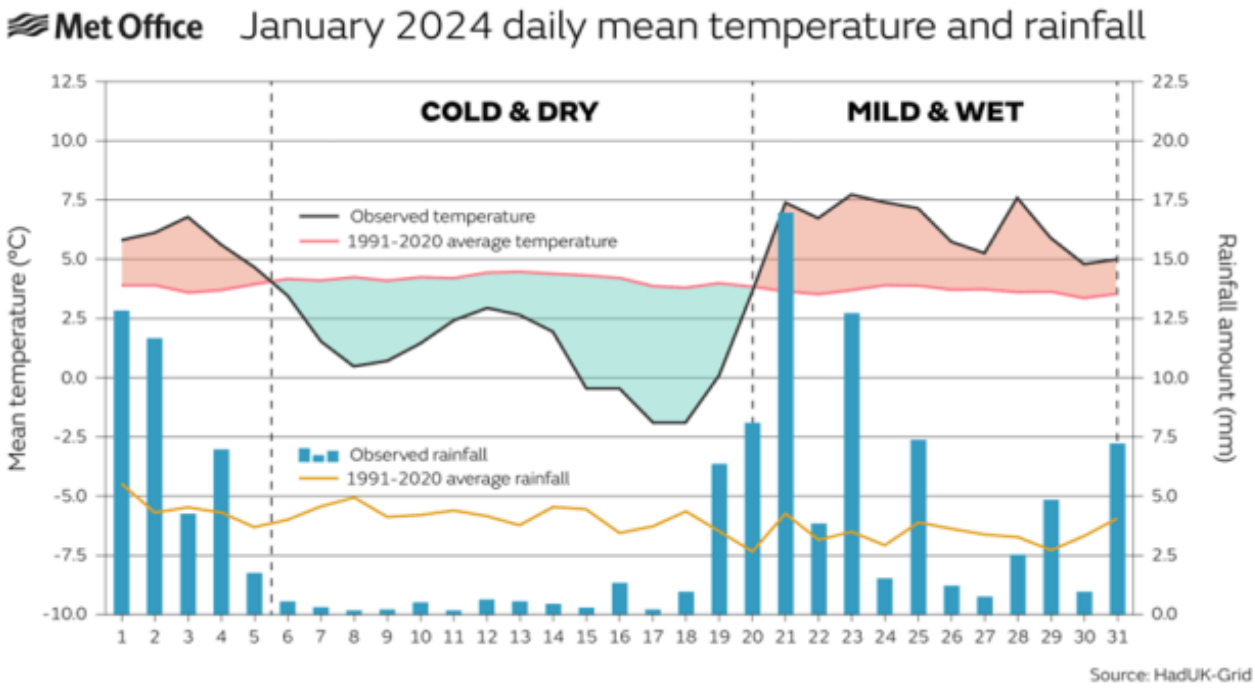
Date Created
February 2024

Our changing weather patterns: a tale of abrupt transitions

Description

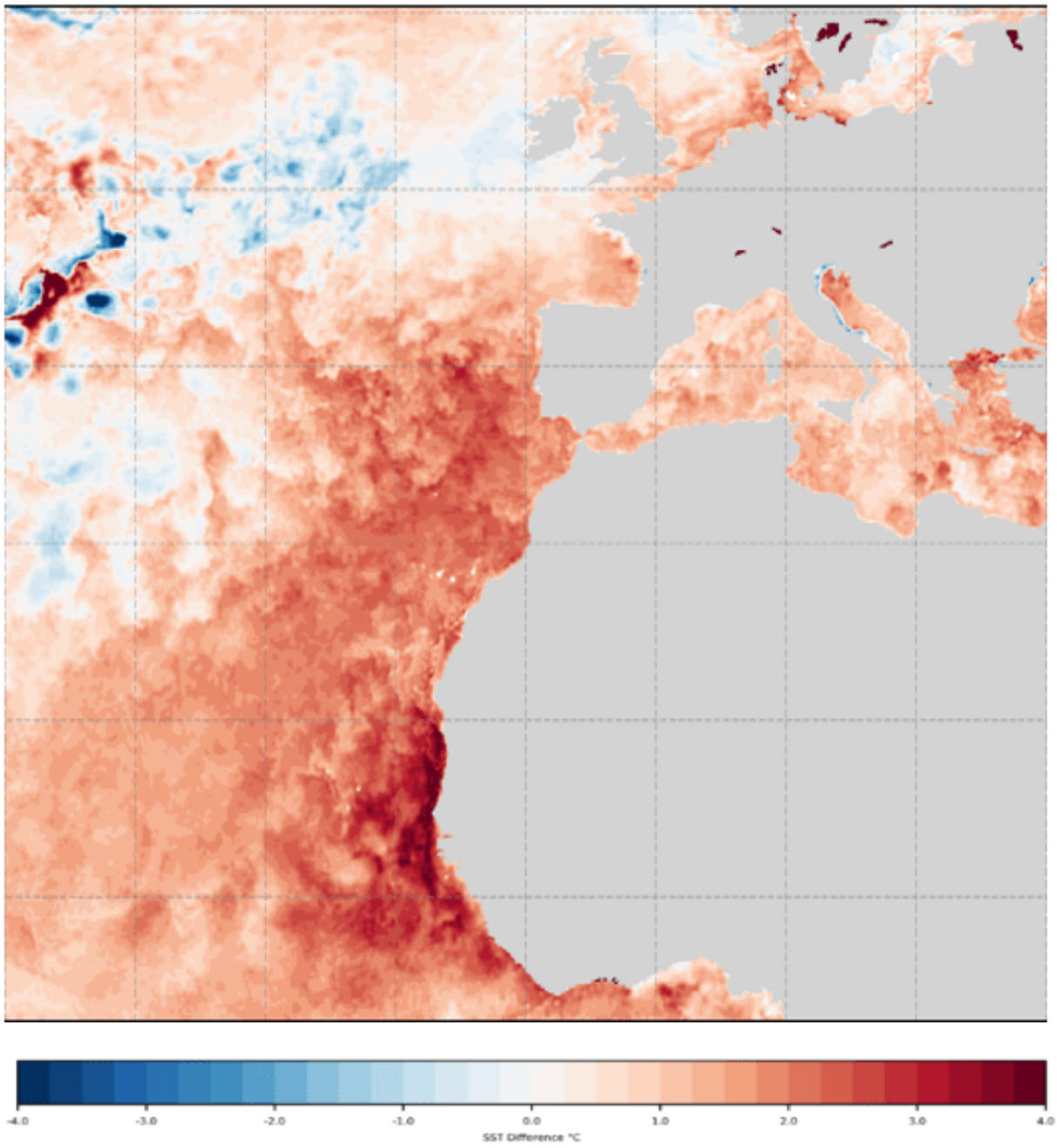
Our weather is notoriously changeable – that is partly what makes it one of the nation's talking points. But peering through the statistics a striking pattern emerges: one where the weather oscillates abruptly between different and contrasting phases lasting for a while before the next phase in the sequence begins to dominate.

Let's look at January's conditions: the average across the month isn't headline grabbing. But the pattern back-and-forth between weather types is remarkable.



The year began warm, but within the first five days it had transitioned to a notably cold and dry period. But then, after a further couple of weeks, it transitioned again to a mild and wet spell.

Tapping into warmth



Sea-surface temperature anomalies from the latest OSTIA analysis, 01 February 2024, compared to the European Space Agency Sea Surface Temperature Climate Change Initiative (ESA SST CCI) climatology data. Indicative of the source region for southern UK coming from the maritime heatwave west of NW France and Portugal.

February may turn out to be remarkable on many fronts. Exceptionally mild and wet across a broad swathe of the UK in the first week, with a major change from the end of this week and beyond as very cold air from Scandinavia floods south into the UK.

We can project these extremes onto large-scale weather patterns: with high pressure towards

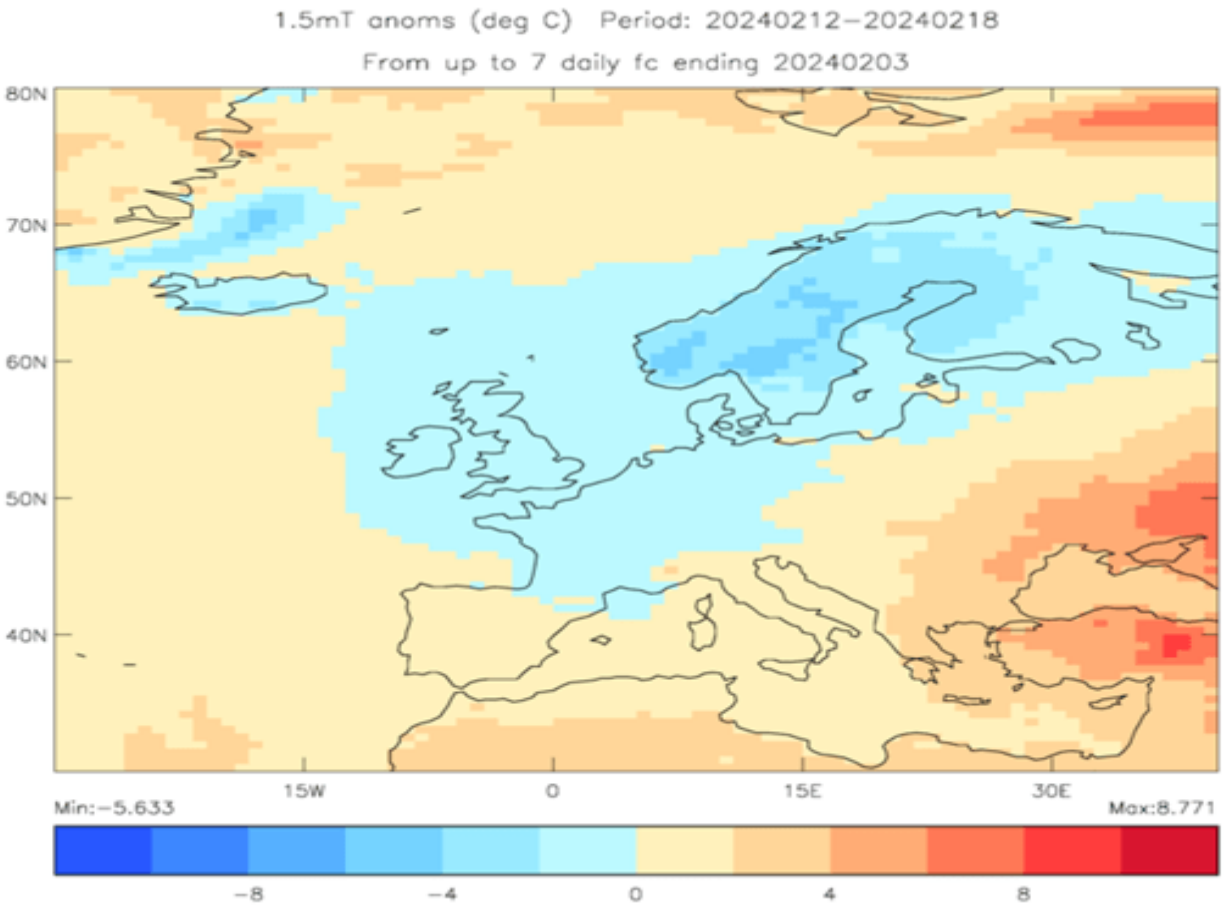
Greenland; low pressure over Scandinavia; and low pressure occasionally stretching across the UK and into continental Europe. This pattern is characteristically described as a block; when the atmosphere gets ‘stuck’ for long periods of time.

Paul Davies is the Met Office’s Principal Meteorologist. He said: “Against this backdrop, the tropical Atlantic is very warm. Sea temperatures off the north-west African coast are currently comparable to values more typical for July.

Winds will continue to tap into this area of warmth, briefly drawing modified air north into southern and western parts of UK. This tropical-sourced air is being forced to rise as it comes up against the blocked pattern and over western hills bringing persistent, locally heavy rain here, and as the air descends to the lee side of these hills it has been introducing very mild and gusty conditions; because of the foehn effect.” This effect – which occurs where air crossing mountains is warmer and drier on the lee side – was also responsible for the record-breaking January temperature in NW Scotland. The weather station at Achfary recorded 19.9°C on 28 January: a new UK daily maximum temperature for January; and a new winter record for Scotland.

Colder conditions ahead

Paul Davies continued: “Then comes the expected change in weather, with winds switching north and drawing very cold air from the Arctic, initially arriving across Scotland, Northern Ireland and Northern England later this week and then heading further south into southern England. This may mean a significant contrast between the recent weekend, and next weekend with spring-like conditions one weekend and the potential for wintry hazards, especially in those regions susceptible to east and northeasterly winds across northern parts of the UK next weekend.”



Temperature anomalies from the latest GloSea forecasts for the week commencing 12 February. It shows cold air over the UK and deep cold residing over Scandinavia. GloSea is the seasonal prediction system developed and run operationally at the Met Office.

The forecasters' challenges will be to determine:

- the exact arrival time of the cold conditions;
- and the associated battleground between the cold air in the north, and the mild in the south. This will create a zone of disruptive weather, including heavy rain, snow and ice.

At this stage it's too early to predict with any confidence the evolving story. But if the boundary pivots and stalls, it could result in snow and blizzards for some. If the cold air digs south more quickly, frost and ice may be the hazards to watch out for; while if the cold air is restricted to the north, the hazards may be rain and strong winds in the south, with snow confined to Scotland, Northern Ireland and Northern England.

Phil Stocker is the chief executive of the National Sheep Association. He said: "The late winter and early spring period can be an extremely concerning time for livestock farmers, particularly those working in the UK's more exposed and upland areas. Any cold snap, especially if accompanied by significant snowfall, can bring notable hardship to livestock, and of course hill farmers.

"I find it helpful that the Met office is doing more to warn of the risk of bad weather conditions – it gives

farmers the chance to assess the risks and do what they can to prepare.”

Paul Davies added: “It’s a close call with only minor wobbles in the weather patterns changing the course of the evolution and associated impact to the UK.”

Through to early March, there is increasing chance of sleet or snow, especially in the north and east of the UK with greater than normal potential for disruptive snow. The specific locations wintry hazards will become clearer as the lead time decreases.

Our advice therefore is to keep abreast with the latest forecasts and warnings.

Date Created
February 2024

A precautionary approach required to avoid large-scale collapse of the Amazon forest

Description

The Amazon is a complex dynamical system with extraordinarily diverse terrestrial and aquatic ecosystems which are home to more than 10% of Earth's biodiversity, as well as 40 million people.

It is one of the most critical elements of the Earth's climate system, with the forest acting as a giant "air-conditioner", lowering land-surface temperatures and generating rainfall in the region. as well as exerting a strong influence on the atmosphere and circulation patterns, both regionally and globally. It also acts as an important terrestrial carbon sink, absorbing more carbon from the atmosphere than it releases and storing an amount of carbon equivalent to 15-20 years of global CO_2 emissions (150-200 Pg C), helping to limit atmospheric concentrations and accelerated global warming.

The pied tamarin is one of the world's most threatened primates. Confined to a small part of the Brazilian Amazon rainforest, the Critically Endangered monkey is affected by several factors, largely linked to deforestation. Picture: Shutterstock

Large parts of the Amazon forest, however, are projected to die within this century due to climate and land-use changes, which could trigger cascading effects and push Earth's climate to a substantially warmer and unpredictable state. It remains uncertain whether a large-scale dieback of the Amazon could actually happen within the 21st Century though the possibility has raised significant global concern.

A new study led by Dr Bernardo Flores of the Federal University of Santa Catarina and including a team of collaborators from Brazil, Europe and the USA, *Critical transitions in the Amazon forest system*, has synthesised existing evidence for five potential critical thresholds in the Amazon forest. In the context of climate science, a critical threshold refers to potential tipping points in the earth's system or related processes which, if passed, can cause sudden, dramatic or even irreversible changes to some of the earth's largest systems, such as the Antarctic ice sheet or the Amazon rainforest. The resulting socio-economic impacts could be very large, and crossing of one critical threshold may then make others more likely to be crossed. Understanding the impact of tipping points is an important element of climate change risk assessment.

Tipping point potential

Partly funded by the Climate Science for Service Partnership (CSSP) Brazil and AmazonFACE, the study has assessed the existing evidence combined with the most plausible ecosystem trajectories and spatial climatic variability, identifying areas within the Amazon forest with higher tipping point potential by the year 2050. AmazonFACE conducts crucial work on the existence, magnitude and duration of CO_2 fertilization in the Amazon, which the new study highlights as a key uncertainty in the Amazon crossing a critical threshold.

Flores said: "Findings show that the forest is becoming increasingly exposed to warming temperatures, droughts, deforestation and fires, even in the west of the region that was previously remote to these pressures."

Mechanisms that previously maintained the Amazonian forest's resilience to large-scale tipping points are now weakening, increasing its vulnerability to change. Intensification of climatic variability and disturbance regimes in the region over the coming decades may expose an additional 10 – 47 % of the Amazon forest biome to tipping events. In such scenario, the system could cross the tipping point in accumulated forest loss, triggering a large-scale dieback of the Amazon, and being replaced by either degraded forest, savanna or degraded open-canopy ecosystems. This would result in the region becoming a major source of greenhouse gases rather than a carbon sink, risking efforts to keep global warming below 1.5^{o}C.

Flores continues: "Compounding disturbances are increasingly common within the core of the Amazon. If these disturbances act in synergy, we may observe unexpected ecosystem transitions in areas previously considered as resilient, such as the moist forests of the western and central Amazon."

Opportunities

However, the study reveals opportunities for action to help reduce the pressures on this iconic system and the essential ecosystem services it provides. Findings suggest a list of thresholds that, if well managed, can help maintain the Amazon forest within a safe operating space, avoiding a catastrophic dieback. These depend on ending forest loss and boosting forest restoration at the local scale, but also on global efforts to reduce greenhouse-gas emissions. The consequences of losing the Amazon forest, or even parts of it, imply that we must follow a precautionary approach.

Co-author Professor Richard Betts MBE, of the Met Office, comments: "After 25 years of research, the potential for a tipping point in the Amazon has gone from a theoretical concept to a real and imminent

threat. We still have the chance to avoid it by both stopping deforestation and halting global warming by phasing out fossil fuels, but both of these need to happen urgently."

Article: Flores et al. (2024) "Critical transitions in the Amazon forest system", *Nature*, DOI:10.1038/S41586-023-06970-0.

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